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ABSTRACT

This study investigates hand gesturing behavior produced by mothers communicating with their first born 2- to 3-year-old children and their 4- to 5-year-old children. Thirty-two mother-child pairs were assigned to groups balanced equally for age and sex. After it was confirmed that the older children produced longer utterances, the mother-child pairs were given four randomly ordered tasks designed to measure gesture production. The tasks included a description of a grocery shopping event, a storytelling task, an object description task, and a toy manipulation task. The first two minutes of each task were videotaped and analyzed for frequency and type of gestures produced. The results indicated that task and age significantly influenced the frequency of all gesture types produced. The object description task evoked the most gestures and the toy manipulation task evoked the least. Mothers of older children tended to produce more gestures and more complex types of gesture than mothers of younger children, indicating that they were making developmental adaptations in their gesture behavior while communicating with their children. Further investigations of the development of nonverbal forms of communication and of the relationship between verbal and nonverbal systems are necessary to provide a basis for detecting communication deviance and delay and developing programs to teach nonverbal skills to language impaired children. (Author/RH)

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Mothers' Production of Hand Gestures While Communicating with their Preschool Children Under Various Task Conditions

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ABSTRACT

Hand gesturing behavior produced by mothers communicating with their first born two to three or four to five year old children was investigated. Thrity-two mother-child pairs were assigned to groups balanced equally for age and sex. After it was confirmed that the older children produced longer utterances, the mother-child pairs were given four randomly ordered tasks designed to measure gesture production. The tasks included a description of a grocery shopping event, a storytelling task, an object description task, and a toy manipulation task. The first two minutes of each task were videotaped and analyzed for frequency and type of gestures produced. The results indicated that task and age significantly influenced the frequency of all gesture types produced. The object description task evoked the most gestures and the toy manipulation task evoked the least. Mothers of older children tended to produce more gestures and more complex types of gesture than mothers of younger children, indicating that they were making developmental adaptations in their gesture behavior while communicating with their children.

Definitions of communication vary from the simple to the complex. According to Dance (1967), communication involves anything that elicits a response. According to Wiener, Devoe, Rubinow, and Geller (1972), communication must incorporate the concept of a shared code. Other investigators include intent on the part of the speaker in their definitions (Ekman & Friesen, 1969; MacKay, 1972). Wiener and Mehrabian (1968) define communication as any representation of experience (i.e., the conversion of raw sensory data into a code).

Although definitions differ, most researchers agree that communication is a multi-channel phenomenon (Birdwhistell, 1968). Wiener and Mehrabian (1968) define channel as "any set of behaviors in a communication which has been systematically denoted by an observer to carry information (in principle at least) independently of any other co-occurring behaviors" (p. 51). Wiener and Nehrabian identify three sets of behaviors or channels for communication: a) linguistic behavior, including the semantic and syntactic aspects of language most often produced in the form of speech; b) extralinquistic behavior, referring to variations in tonal qualities, including pitch, stress, and pauses (Mahl and Schulze, 1964); and c) body movement, involving facial expressions, hand gestures, body posture, and body position.

In analyzing the speech of children conversing with their mothers, considerable information concerning the developmental sequences of various linguistic structures has been provided (Brown, 1973). The results of further research show that mothers adapt their language to the child's level of language development (Fraser & Roberts, 1975; Moerk, 1972, 1974, 1975; Nelson, 1973; Phillips, 1973; Reichle, Longhurst, & Stephanich, 1976; Rondal, 1978). However, since language is only one aspect of the communicative process, Mahoney and Seely (1976) suggest that greater understanding of language

development in children can be obtained by studying language development in terms of the development of communication including the extra-linguistic and body movement behaviors.

In studying extra linguistic behaviors, Broen (1972) found that mothers make adaptations in their extra-linguistic behaviors based on their child's language level. Mothers' speech to younger less linguistically-advanced children was slower, contained a lower type-token ration, included fewer disfluencies and was marked by distinctive pauses between sentence boundaries. Moss, Robson and Pedersen (1969) demonstrated that the mothers whose voices were rated as expressive provided more stimulation to their infants. Milmoe, Novey, Kagen and Rosenthal (1974) found that the mother's voice quality and the behavior of her child was correlated.

Ling and Ling (1974) studied both linguistic and body movement behaviors during interactions between mothers and their children (ages one to thirty-six months). They also tested the effects of birth order and sex of the children on linguistic and non-verbal behaviors. Age, birth order, and sex of the child were factors in influencing the mother's and child's communicative behaviors. While the Ling and Ling effort is commendable, the measured response categories, including the general categories of facial expression, body posture, and manipulation of objects, appear to be too broad. To determine developmental progress, Wiener and Mehrabian (1968) suggest that the analysis of communication development begin by studying all channels simultaneously.

As a result, Wiener et al. (1972) developed a system for identifying specific types of communicative hand and arm gestures in order to analyze the role of the gestures within the communication process. Jancovic, Devoe, and Wiener (1975) then used the gesture coding system originally developed by Wiener et al. (1972) to study children's gesture behavior. In this study

Jancovic et al. hypothesized that nonverbal forms of communication were not primitive forms of communication but an essential aspect of the communication process; nonverbal communication development should parallel the linguistic development of children. To determine whether the production of nonverbal forms of communication increased in frequency and complexity with increased age, Jancovic et al. measured the frequency and type of gestures produced by children at 4, 6, 7 1/2, 11, 14 14 1/2, and 18 1/2 years of age. After the children viewed a cartoon story, their gesture behavior was measured while they described to the experimenter what they had observed. The types of gestures Jancovic et al. measured, were defined as follows:

> (1) deictics--pointing movements denoting or specifying the spatial location of a...concrete object or event; (2) pantomimics--movements which copy or mimic some visual or kinesthetic attribute of a concrete object or event...; (3) semantic modifying and relational hand and arm movements-- (a) semantic modifiers, movements which add modification, amendment or contrast to the content in the verbal channel...; (b) relational hand and arm movements which add to the communication in the verbal channel, some information between the addressor and the addressee, as viewed by the addressor. (Jancovic et al. 1975, p. 924)

The results showed that as the ages of the children increased, the number of gestures produced increased. Further, the older children tended to produce a greater percentage of semantic modifying and relational gestures, which Jancovic et al. believed to be communicatively more complex then deicitic or pantomimic gestures. All age groups produced few deicitic gestures and Jancovic et al. concluded that this was due to the limited opportunities for deicitic production of the storytelling task.

To extend the research begun by Jancovic, et al., the present study was designed to assess whether there were differences in deicitic, pantomimic, and semantic gesture production between mothers speaking to first born two-to-three year old children who are in the early stages of language development and mothers speaking to first born four-to-five year old children who are in the later stages of language development (Broen, 1973; Rondal, 1978). Considering the lack of information on gesturing behaviors produced by adults communicating with children, the study was also designed to assess the effects of sex and task conditions on the number and type of gestures produced by mothers communicating with their children.

Method

Subjects

Thirty-two mother-child pairs from the Minneapolis-St. Paul area were selected from the 36 mother-child pairs who were contacted regarding participation in the study. The thirty-two mother-child pairs were assigned to groups equally balanced for age and sex. Each group consisted of eight mothers with first born males and eight mothers with first born females. The younger group of children ranged in age from 23 to 39 months with a mean age of 30.81 months, and the older group of children ranged in age from 49 to 63 months with a mean age of 53.31 months. The mothers had completed high school and were married. The family income was $10,000 or greater. The father's occupational status was rated in terms of Hollingshead's (Note 1) "Two Factor Index of Social Position". All but three of the fathers were in professional positions. No children participating in the study scored more than one standard deviation below the mean for their age group on the Peabody Picture Vocabulary Test (PPVT) and no children showed any visible or noticeable signs of language impairment or other physical or mental handicap (see Gutmann, 1976).

Materials

The study was conducted in a two-room experimental suite. The Experimental Room contained a child-sized table and two child-sized chairs for the mother and child who were next to each other. Two microphones (Sony Electret Condensor) were suspended from the ceiling to the right and left of the table. A video camera (Sony, Model No. AVC 3200) was placed on the wall facing the table and chairs. The camera was focused on the table and the upper torsoes of the mother and child. The video recorder and cassette recorder were located in the control room.

Procedure

The mother's participated in one task to measure the linguistic level of the children's speech and four tasks to measure gesture production. The first task, a picture description task, was designed to determine the child's mean length of response (MLR), which measures the average number of words per utterance, and to substantiate the fact that the younger children were less linguistically advanced than the older children. The mother asked her child to describe the occurrences in the sequence pictures and the first five minutes of the mother's and child's verbal behavior were audio taped. The remaining four tasks were designed to study the frequency and type of gestures the mothers used while communicating with their children. An Event Description Task, a Storytelling Task, and an Object Description Task were selected because they were similar to the tasks used in the work of Wiener et al, (1972) and Jancovic et al. (1975) and would provide some basis for comparison with prior gesture production research. A toy manipulation task requiring the mothers to direct their children to manipulate a set of toys was designed to determine whether this instrumental activity task would evoke more deictic. The first two minutes of each gesture task were audio and video taped.

To allow free use of hands and arms, the mothers were instructed not to hold or touch their children during the four tasks. If the child left the table for part of the two-minute period, additonal recording time was alloted when possible, to obtain two minutes of video tape for each task. The last four gesture tasks were presented in random order to each mother-child pair and the mothers were not informed that gestures were being studied. The materials and specific task procedures are described below (also see Gutmann, 1976).

Picture Description Task: Materials for this task included 12 sequential pictures from Weiss, Goodwin, and Moores (Note 2) and consisted of three pictures per sequence. These pictures have been placed on a cardboard strip in the appropriate sequential order and laminated. Examples of the pictures presented include a girl reading a book and a boy pulling a wagon.

Event Description: The materials used in this task were a set of sequence pictures entitled, "Sequential Picture Cards I" (Cat. No. 127) produced by Developmental Learning Materials (1969). The three five picture sequences selected from the set were: a mother grocery shopping and prepaiing dinner; a little girl going to school; and, a little boy playi g in the snow. The five pictures were arranged in sequential order. Mothers were asked to study the picture sequence pertaining to the mother grocery shopping and preparing dinner and to construct a story relating to the events in the picture sequence. The picture sequence was then removed and the mothers were asked to tell the story to their children. To give an apparent purpose to the task the mothers were told that their children would be shown a test set of all three picture sequences and would be asked to identify the sequence depicting the story that they had heard.

Toy Manipulation: Materials used in this task consisted of a 30.48 cm. X 30.48 cm. X 30.38 cm. cardboard box containing the following toys: a yellow

auto transport truck, a large baby doll, a medium-sized yellow toy car, a small doll-sized blanket, a mental 224 gram glass, and a small red metal toy fire engine. The mothers were instructed to direct their children to manipulate the toys in as many ways as they could think of without touching either the toys or their children.

Object Discription: Twenty words, representing objects were randomly selected from the first 15 plates of the PPVT and each word was written on a 7.62 cm X 12.70 cm. card. Five of the 20 words were identified as practice words. The remaining 15 words were used as task words. Examples of the words given to the mother are a spoon, a ball, and a cup. The purpose of the task was to have the mother describe the objects so that the child could guess what the objects were.

Storytelling: A story entited, "The Red, White and Bluebird" was selected from Dinkmeyer's (1970) program Developing Understanding of Self and Others. The mothers were instructed to read the story and study the pictures which accompanied the story. The story and pictures were removed and the mothers were required to describe the events in the story to their children. To give the task purpose, the mothers were told that the child would have to order the five pictures that accompanied the story in the proper sequence after they had told the story to their children.

Techniques of Analysis

MLR Measurement: The MLRs of the children were calculated from the verbal response produced in the Picture Description Task using the method of word and utterance identification described by Johnson, Darley, and Spriesterbach (1963).

Gesture Analysis: Only gestural responses that occurred with speech

and that did not involve physical contact with another person (i.e., touching, manual guidance) or the direct manipulation of objects (i.e., bouncing a ball, holding a doll) were recorded for each subject on each task. The video tapes were viewed and hand gestures were coded on the basis of the system described by Jancovic et al. (1975).

Reliability of .97 on the MLR Measurement was determined by randomly selecting ten transcripts from the Picture Description Task including equal numbers of younger and older children. A second experimenter redetermined the MLR score on each transcript and the percentage of agreement was obtained by dividing the higher MLR score into the lower. Reliability of .95 on the gesture classification system was determined by a second experimenter who randomly selected five mother-child pairs from each group, rescored the gesture data on all four tasks, and then divided the number of agreements (gestures counted and gestures identified) by the number of agreements plus disagreements in the first and second experimenter scoring. Differences in determing reliability between MLR scores and gesture scores were due to the fact that errors could occur in identifying the production of a gesture as well as in classification of the gesture.

Results

Analysis of the Children's Speech

A two-way (Age X Sex) univariate analysis of variance (ANOVA) for non-repeated measures carried out on the MLRs children showed that the younger group MLRs ($\bar{x}$=2.84) were significantly different from the older group MLRs ($\bar{x}$=5.73); $F(1,28) = 19.12$, $p < .001$.

Analysis of Mothers' Proudction of Gestures

A total of 704 gestures was produced by the 32 mothers. The means and

standard deviations for the gestures produced by mothers are presented in Table 1.

Insert Table 1 about here

An over-all three-way (Age X Sex X Task) multivariate analysis of variance for repeated measures (MANOVA) was conducted on the frequency of mothers' gestures in the three response categories. The MANOVA for repeated measures was generated from the three-way univariate analysis of variance for repeated measures (ANOVA) model described by Winer (1971). All multivariate tests of significance were carried out using F -- statistic approximations of Wilks Lambda and following the procedures for conducting MANOVA's described in version 7.0 of the Statistical Package for the Social Sciences (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975).

According to Hummel and Sligo (1971), when one is analyzing multivariate data, one increased the probability of a Type I error by running individual ANOVA's on the dependent variables without first conducting an overall multivariate analysis. With rejection of the null hypothesis on the MANOVA, one can then follow up the analysis with individual ANOVA's on the individual dependent variables.

The three way MANOVA for repeated measures conducted on the frequency of gestures produced by the mothers indicated significant task, F (9,199.72) = 7.96, p <.0001, and age, F (3,26) = 3.62, p <.03, effects. With the rejection of null hypothesis for task and age effects, a three-way (Task X Sex X Age) univariate analysis of variance for repeated measures was conducted on each of the three gesture types to determine whether task and/or age affected the various types of gestures produced.

Significant task effects were found for Deictics, F (3,84) = 7.49, p .001, Pantomimics, F (3,84) = 15.12, p <.0001, and Semantics, F (3,84) = 5.26, p <.003. Significant age effects were found for Semantics, F (1,28) = 11.32, p <.003. No significant sex effects or interaction effects were obtained. However, inspection of Table 1 indicates that on the Event Description and Storytelling Tasks, mothers of younger males tended to produce fewer gestures than mothers of younger females. These sex differences were reversed for the older group. On the Object Description Task, mothers of both older and younger females tended to produce more gestures than mothers of males.

Table 2 depicts the production of the three gesture types per task.

Insert Table 2 about here

Pantomimics and semantics occurred more frequently on the three descriptive tasks and Deictics occurred more frequently on the Toy Manipulation task.

Additional analyses showed that the younger group mothers produced proportionately more pantomimics than the older group mothers in the Event Description, Storytelling, and Object Description Task. This analysis was conducted by dividing the total number of gestures produced by the younger and older group mothers in each of the three tasks into the total number of pantomimics produced by the mothers in each group. On the Event Description Task, 67 percent of all the gestures produced by the younger group mothers were pantomimic while only 50 percent of the total number of gestures produced by the older group mothers were pantomimic. In the Storytelling Task, 71 percent of the gestures produced by the younger group mothers were pantomimic and 64 percent of the gestures produced by the older group mothers

were pantomimic. In the Object Description Task, 91 percent of the younger mothers' gestures were pantomimics and 76 percent of the older mothers' gestures were pantomimics.

Table 3 depicts the mothers' production of Semantic gestures over tasks in relation to the younger and older age groups.

Insert Table 3 about here

Older group mothers produced more Semantic gestures. This was particularly apparent on the Event Description Task and the Storytelling Task.

Discussion

The experimental findings show that mothers do make adaptations in their gesture behavior based on age and developmental level of the child. The findings also support the Jancovic, et al. (1975) hypothesis that gesture behavior is not necessarily a more primitive means of communication nor merely a precursor to more complex means of communication as Werner and Kaplan (1963) hypothesized in their developmental analysis of deixis. While some types of gestures, such as deictics may occur prior to verbal forms of communication, gesture forms of communication do increase in frequency and complexity with advanced developmental levels and do parallel the development of linguistic communication. However, in considering developmental differences one must also take into account the effect of task conditions which strongly influenced the mothers' gesture production.

The three descriptive tasks evoked the greatest numbers of gestures and the Toy Manipulation Task evoked the least numbers of gestures.

On the descriptive tasks, pantomimic gestures were most frequently observed. While older group mothers produced more pantomimic gestures on the Event and Storytelling tasks, significant developmental differences were not obtained on the overall analysis. According to Wiener, et al. (1972), one would expect a high proportion of the pantomimics to occur when communicating with persons who had limited knowledge of the language. Since neither group of children had reached adult levels of linguistic competency, the results could lend support to the Wiener, et al. hypothesis concerning the production of pantomimics. However, the behavior of the adults speaking to adults was not assessed, so it remains to be seen whether t sk variables or the subjects' language level controlled the production of pantomimics in the three descriptive tasks. Possibly a more sensitive analysis may show differences in the complexity of the pantomimic gestures used when speaking to younger and older children.

Significant developmental differences were observed only in the production of semantic gestues, which also occurred more frequently in the Descriptive Tasks. Inspection of the data indicates that the older group mothers' production of semantic gestures accounted for the significant overall increase in their gesture production and also accounted for the decrease in percentage of pantomimic gestures produced by the older group mothers. These results, in turn, lend support to the research conducted by Jancovic et al. (1975). According to these investigators, semantic gestures are developmentally more complex than pantomimic gestures. Consequently, if mothers do make adaptations in their nonverbal communication styles based on the developmental level of their children, one would predict that mothers of older children would produce more semantic gestures. Given these findings, it now

becomes of interest to determine whether the children's nonverbal communicative ability, their verbal communicative ability or both verbal and nonverbal ability influenced the mothers' semantic gesture production.

Nonsignificant trends for sex differences occurred on all Descriptive Tasks (see Table 1). In both the Event Description and Storytelling Tasks, across all gesture categories, mothers of the younger males produced fewer gestures than mothers of females. Cherry and Lewis (1976) report that mothers talking to their two-year-old daughters used longer and more complex utterances than mothers talking to their two-year-old sons. Future investigation may show that mothers communicate both verbally and nonverbally in shorter and less complex forms with their young sons. Trends for sex differences were also observed in the performance of the older group mothers on the Event and Story Telling Tasks. Mothers of the older males produced more gestures than mothers of the older females. In the Object Description Task, mothers of the younger and older females produced more gestures. Whether these differences in mothers of males and females could also be related to sex differences in the mothers' language style is not known. Before making conclusive statements relating the sex of the child to the gesture production of the mother, additional research with larger samples is required.

As expected, the Toy Manipulation Task evoked more deictics than pantomimics or semantics. While significant developmetnal differences were not obtained, the younger group mothers did tend to use more deictic gestures than the older group mothers. These results would lend support to the idea that deictic gestures are developmentally less advanced than pantomimics and semantic gestures (Jancovic et al., 1975); they also

support the Werner and Kaplan (1963) theory which states that deictics are one of the first forms of referential communication. However, the results do not support the Werner and Kaplan theory that gestures are a more primitive form of communicative behavior.

In a recent study, Murphy and Messer (1977) analyzed pointing or deictic gestures produced by mothers interacting with nine and fourteen month old infants and found significant developmental differences. Murphy and Messer observed 428 gestures compared to the 58 deictics observed in this study. The differences in frequencies, which must be considered proportionately since Murphy and Messer observed for five minutes, could be attributed to obvious differences in tasks, in that Murphy and Messer required mothers to call the infant's attention to one of three objects that were out of reach of the child. However, one must also consider that the children in the present study were older, and that Murphy and Messer broke the deictic gestures into several different categories and types. To determine whether there are developmental differences between the production of deictic gestures produced by mothers communicating with infants as well as two to three year olds and four to five year olds, a group of tasks, including some similar to the one used by Murphy and Messer, should be arranged and comparable classifications an analyses of the gestures should be conducted.

The differential effects of task variables on the frequency and type of gestures provokes questions about specific characteristics of the tasks and the nature of their influence. Certain task variables could function to differentially inhibit the production of deictics, pantomimics, and semantics. For example, in the Event Description Task, if the mothers had been allowed to keep the picture of the mother going grocery shopping and preparing dinner while they related a story to their children, they might have

used more deictics; furthermore, they might also have used fewer pantomimics or semantics. Additional research must be conducted to study the specific effects of task variables and to determine whether it would be possible to construct a task that would freely evoke all types of gestures.

The implications of this research and continued work in the field can lead to the better understanding of the developmwnt of communication skills in children both nonhandicapped and handicapped. According to Mahoney (1975) a person must develop an extensive nonverbal communication network in order to be an effective communicator. However as pointed out in the present paper, there has been very little research concerning the development of nonverbal forms of communication, nor on the interrelationship between verbal and nonverbal systems in the development of communication skills in both nonhandicapped as well as handicapped children (Berry & Marshall, 1978; Mitchell, 1975). Without an understanding of the nature of the development of nonverbal forms of communication there is no basis for detecting deviance or delay of nonverbal skills in the handicapped. Also there is no basis for developing programs to teach nonverbal communication skills if one has not identified the skills to be taught.

Within recent years there has been an increasing amount of interest in nonvocal forms of communication with the language impaired child. (Fristoe & Lloyd, 1978; Goodman, Wilson & Bornstein, 1978; Lloyd, 1976; Vanderheiden & Grilley, 1976). Even though there is an increasing number of programs and studies involving the use of gestural systems and nonvocal systems of communication Fristoe and Lloyd (1978) and Goodman et al. (1978) point out that there is relatively little consideration given to the selection of the nonvocal communication systems to be taught to a particular handicapped child.

By continuing to conduct research to better understand the various forms and type of nonvocal communication and to better understand the interrelationship between verbal and nonverbal forms of communication, information concerning the facilatory or inhibitory effect of nonverbal forms of communication on the development of verbal forms of communication can be obtained. With additional information it will be possible to develop more effective and efficient training programs to teach communication skills to communicatively delayed children.

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Unnumbered Footnote

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Table 1

Group X Sex X Task

Ms and SDs are Presented for the Frequency

of Different Gesture Types Produced by Mothers

Younger

	Male				Female			
	Event Description	Toy Manipulation	Object Description	Story Telling	Event Description	Toy Manipulation	Object Description	Story Telling
Deictics								
M	0	1.75	.38	.38	.50	2.88	.25	.50
(SD)	(0)	(2.43)	(1.06)	(.52)	(1.41)	(4.45)	(.46)	(.76)
Pantomimics								
M	1.25	.0	5.00	2.25	2.75	.25	8.50	4.00
(SD)	(2.43	(.0)	(2.45)	(1.83)	(3.33)	(.71)	(7.27)	(4.47)
Semantic								
M	.13	.0	.25	1.00	1.38	.25	.50	.63
(SD)	(.35)	(.0)	(.46)	(2.14)	(2.00)	(.71)	(.76)	(.92)
Total								
M	1.38	1.75	5.63	3.63	4.63	3.38	9.25	5.13
(SD)	(2.39)	(2.43)	(2.77)	(3.70)	(5.55)	(4.81)	(7.83)	(5.28)

Table 1 continued...

Group X Sex X Task

Ms and SDs are presented for the Frequency

of Different Gesture Types Produced by Mothers

Older

	Male				Female			
	Event Description	Toy Manipulation	Object Description	Story Telling	Event Description	Toy Manipulation	Object Description	Story Telling
Deictics								
M	.75	1.50	.0	.63	.13	1.13	.25	.63
(SD)	(1.49)	(2.20)	(.0)	(.92)	(.35)	(1.46)	(.71)	(.74)
Pantomimics								
M	3.63	.0	4.75	5.88	3.88	.13	7.38	6.75
(SD)	(3.58)	(.0)	(5.34)	(4.05)	(3.60)	(.35)	(7.62)	(6.32)
Semantic								
M	4.38	.13	.88	4.13	2.13	.0	2.63	1.63
(SD)	(4.50)	(.35)	(1.13)	(3.14)	(3.00)	(.0)	(5.13)	(1.60)
Total								
M	8.75	1.63	5.63	10.63	6.13	1.25	10.25	9.00
(SD)	(7.96)	(2.13)	(6.07)	(7.54)	(5.74)	(1.58)	(8.68)	(7.80)

Table 2

Mean Population Frequencies and Standard Deviations for Gesture Types Across Tasks.

	Event Description	Toy Manipulation	Object Description	Story Telling
Deictics				
M	.34	1.81	.22	.53
(SD)	(1.04)	(2.80)	(.66)	(.72)
Pantomimics				
M	2.88	.09	6.41	4.72
(SD)	(3.28)	(.39)	(5.95)	(4.59)
Semantics				
M	2.00	.09	1.06	1.84
(SD)	(3.16)	(.39)	(2.70)	(2.44)
Total				
M	5.22	2.00	7.69	7.09
(SD)	(6.11)	(2.97)	(6.74)	(6.65)

Table 3

Mean Age Group Frequencies and Standard Deviations for Semantic Gestures Produced Across Tasks.

	Event Description	Toy Manipulation	Object Description	Story Telling
Younger Group Mothers				
M	.75	.13	.38	.81
(SD)	(1.53)	(.50)	(.62)	(1.60)
Older Group Mothers				
M	3.25	.06	1.75	2.88
(SD)	(3.87)	(.25)	(3.70)	(2.73)